CLAIMS

What is claimed is:

1   1.   A method of generating an external correlation key value for use in correlating alarms

2   emitted by network elements or system elements in a telecommunications network, the

3   method comprising the steps of:

4   receiving an alarm message generated by a network element or system element of the

5   telecommunications network;

6   identifying a context value in the alarm message;

7   retrieving, from a table that associates context values to internal correlation key value

8   formulas, a formula specifying how to generate an internal correlation key

9   value;

10   creating and storing the internal correlation key value based on the formula;

11   creating a unique external correlation key based on the internal correlation key value;

12   and

13   sending the alarm message and external correlation key value to an external system

14   for use in correlating alarms.

1   2.   A method as recited in Claim 1, wherein the alarm message is an SNMP message, the

2   context value is an SNMP context string, and the external key is an ordinal number.

1   3.   A method as recited in Claim 1, wherein the external system is an OSS system of a

2   telecommunications service provider.

1   4.   A method as recited in Claim 1, wherein the table is stored at a gateway that is

2   logically located in the telecommunication network between the network element or system

3   element and an OSS system of a telecommunications service provider.

1   5.   A method as recited in Claim 1, wherein each formula in the table specifies, for an

2   associated context value, one or more ordinal positions of fields in the alarm message.

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1 6.   A method as recited in Claim 1, further comprising the steps of storing the internal
2 correlation key value into an internal work area, and generating the external correlation key
3 value that uniquely represents the internal correlation key value.

1 7.   A method as recited in Claim 1, wherein each formula in the table specifies, for an
2 associated context value, one or more fields in the alarm message, a concatenation of which
3 yields the correlation key value.

1 8.   A method as recited in Claim 1, wherein each formula in the table specifies one or
2 more pattern matching procedures to extract one or more fields from the alarm message, a
3 concatenation of which yields the correlation key value.

1 9.   A method as recited in Claim 1, wherein each formula in the table specifies, for an
2 associated context value, one or more ordinal positions of fields in the alarm message and one
3 or more references to objects in an external database system.

1 10.   A method as recited in Claim 1, wherein each formula in the table specifies, for an
2 associated context value, one or more ordinal positions of fields in the alarm message and one
3 or more references to programmatic procedures that are stored in an external database system.

1 11.   A method as recited in Claim 1, wherein each formula in the table specifies, for an
2 associated context value, one or more ordinal positions of fields in the alarm message and one
3 or more references to programmatic procedures that are stored in an external database system,
4 and wherein a concatenation of the fields and a result value from execution of the
5 programmatic procedures yields the correlation key value.

1 12.   A method as recited in Claim 1, further comprising the steps of compressing the
2 external correlation key value such that the external correlation key value is stored in fewer
3 bits than the internal correlation key value.

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1   13.   A method as recited in Claim 1, wherein the table is stored at a gateway that is

2   logically located in the telecommunication network between the network element or system

3   element, and an OSS system of a telecommunications service provider; wherein each formula

4   in the table specifies, for an associated context value, one or more ordinal positions of fields

5   in the alarm message and one or more references to objects in an external database system

6   that is accessible to the gateway; and wherein a concatenation of the fields and objects yields

7   the correlation key value; and further comprising the steps of compressing the external

8   correlation key value such that the external correlation key value is stored in fewer bits than

9   the internal correlation key value.

1   14.   A method as recited in Claim 1, further comprising the steps of:

2   storing the internal correlation key value and external correlation key value in a

3   persistent work area;

4   retrieving the external correlation key value from the persistent work area.

1   15.   A method as recited in Claim 1, wherein sending the alarm message and correlation

2   key value comprises sending an SNMP message to an OSS system that includes a complete

3   SNMP object carrying the alarm message and the external correlation key value in an SNMP

4   field.

1   16.   A method as recited in Claim 1, wherein sending the alarm message and correlation

2   key value comprises sending an XML file to an OSS system that includes the alarm message

3   and the correlation key value identified by unique XML tags.

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1   17.   A computer-readable medium carrying one or more sequences of instructions for

2   generating an internal correlation key value and external correlation key value for use in

3   correlating alarms emitted by network elements or system elements in a telecommunications

4   network, which instructions, when executed by one or more processors, cause the one or

5   more processors to carry out the steps of:

6   receiving an alarm message generated by a network element or system element of the

7   telecommunications network;

8   identifying a context value in the alarm message;

9   retrieving, from a table that associates context values to correlation key value

10   formulas, a formula specifying how to generate the correlation key value;

11   creating and storing the internal correlation key value based on the formula;

12   generating the external correlation key value based on the internal correlation key

13   value; and

14   sending the alarm message and external correlation key value to an external system

15   for use in correlating alarms.

1   18.   A computer-readable medium as recited in Claim 17, wherein each formula in the

2   table specifies, for an associated context value, one or more fields in the alarm message, a

3   concatenation of which yields the internal correlation key value.

1   19.   A computer-readable medium as recited in Claim 17, wherein each formula in the

2   table specifies, for an associated context value, one or more ordinal positions of fields in the

3   alarm message and one or more references to programmatic procedures that are stored in an

4   external database system.

1   20.   A computer-readable medium as recited in Claim 17, wherein each formula in the

2   table specifies, for an associated context value, one or more ordinal positions of fields in the

3   alarm message and one or more references to programmatic procedures that are stored in an

4   external database system, and wherein a concatenation of the fields and a result value from

5   execution of the programmatic procedures yields the internal correlation key value.

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1 21. A computer-readable medium as recited in Claim 17, wherein the table is stored at a
2 gateway that is logically located in the telecommunication network between the network
3 element or system element and an OSS system of a telecommunications service provider;
4 wherein each formula in the table specifies, for an associated context value, one or more
5 ordinal positions of fields in the alarm message and one or more references to objects in an
6 external database system that is accessible to the gateway; and wherein a concatenation of the
7 fields and objects yields the correlation key value.

1 22. An apparatus for generating a correlation key value for use in correlating alarms
2 emitted by network elements or system elements in a telecommunications network,
3 comprising:
4   means for receiving an alarm message generated by a network element or system
5   element of the telecommunications network;
6   means for identifying a context value in the alarm message;
7   means for retrieving, from a table that associates context values to correlation key
8   value formulas, a formula specifying how to generate the correlation key
9   value;
10   means for creating and storing the correlation key value based on the formula; and
11   means for sending the alarm message and correlation key value to an external system
12   for use in correlating alarms.

1 23. An apparatus for generating a correlation key value for use in correlating alarms
2 emitted by network elements or system elements in a telecommunications network,
3 comprising:
4   a network interface that is coupled to the data network for receiving one or more
5   packet flows therefrom;
6   a processor;
7   one or more stored sequences of instructions which, when executed by the processor,
8   cause the processor to carry out the steps of:

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9	receiving an alarm message generated by a network element or system
10	element of the telecommunications network;
11	identifying a context value in the alarm message;
12	retrieving, from a table that associates context values to correlation key value
13	formulas, a formula specifying how to generate the correlation key
14	value;
15	creating and storing the correlation key value based on the formula; and
16	sending the alarm message and correlation key value to an external system for
17	use in correlating alarms.